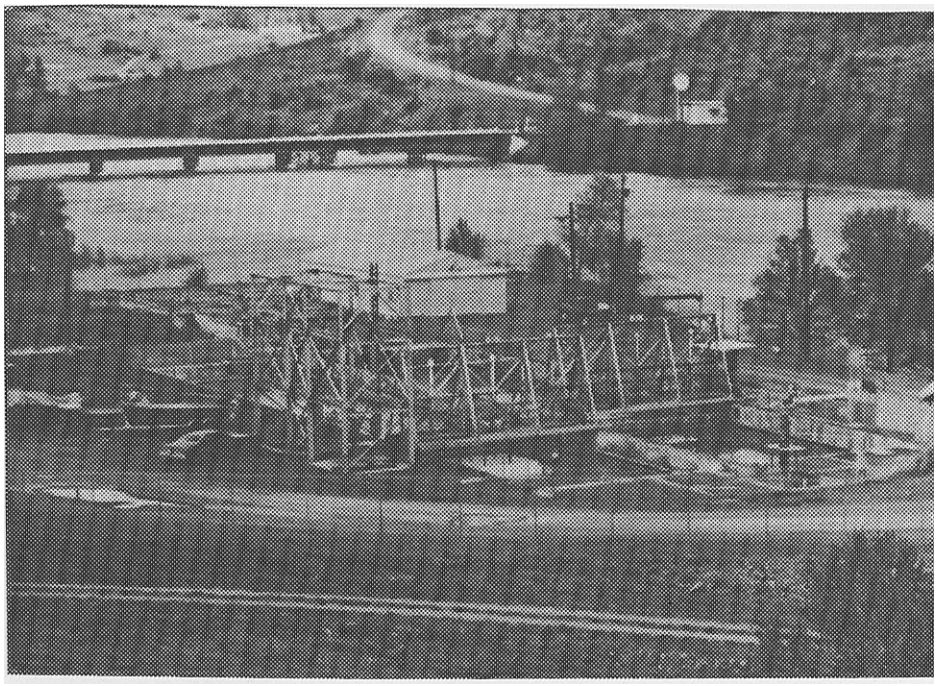
OXBOW FISH HATCHERY

1993 Steelhead Brood Year Report
1992 Spring Chinook Brood Year Report



by

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ABSTRACT

For brood year 1993, the steelhead trout Oncorhynchus mykiss run amounted to a total of 1,259 fish entering the Hells Canyon Dam fish trap. Fall trapping (November 4, 1992 to November 24, 1992) collected all 1,259 fish. Due to high water flows, the trap was not operated during the spring.

Age class breakdown of the run was 1,025 one-ocean fish and 234 two-ocean fish. Wild fish made up .631 (8 fish) of the run. There were 55 marked fish collected; 25 left (or right) ventral clipped with coded wire tags (CWT) and 30 with various other jaw tags or floy tags.

A total of 129 surplus adult steelhead were released into Hells Canyon Reservoir. An additional 200 excess fish were transported and released into the Payette River, and 12 were put in the Morris Knudsen Nature Center ponds.

No fall chinook salmon O. tshawytscha were incidentally trapped during the fall steelhead trapping this year.

Prespawning mortality amounted to 231 steelhead adults (18.31). The spawning operation consisted of 7 egg takes which lasted from March 29 until April 19, 1993. A total of 397 females were spawned with an average fecundity of 3,982 eggs per female. These fish produced 1,580,800 green eggs. The percent eye-up was 87.0%, leaving a total of 1,375,700 eyed eggs.

Niagara Springs Hatchery received 1,375,700 eyed eggs. In addition, approximately 20,000 green eggs and milt from 10 pairs were shipped to Clear Springs Hatchery for their research in selective breeding.

During the spring of 1994, 609,115 steelhead smolts were hauled from Niagara Springs and Babbington hatcheries and were released below Hells Canyon Dam. Included were 85,082 CWT and 402 PIT-tagged smolts.

For brood year 1992, the spring chinook salmon were trapped from May 12 through July 25, 1992. The run amounted to 934 fish; 22 jacks, 894 two-ocean fish, and 18 three-ocean fish. A total of 912 fish were transferred to Rapid River Hatchery.

Prespawning mortality amounted to 22 salmon while on station, and an additional 179 fish after transfer to Rapid River Hatchery. Three hundred thirty-seven females were spawned for a total of 1,264,500 green eggs.

Brood year 1992 spring chinook salmon smolts from Rapid River Hatchery were released during the spring of 1994. These smolts totalled 380,504 and were all marked with an adipose fin clip. From this group, 250 additional smolts were marked with a PIT tag.

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1993 STEELHEAD BROOD YEAR REPORT

INTRODUCTION

Oxbow Fish Hatchery is part of the Idaho Power Company's (IPC) hatchery system and has been in operation since 1962. The Oxbow facility is owned and funded by IPC and operated by the Idaho Department of Fish and Game (IDFG). The hatchery is located on the Oregon shore of the Snake River at mile marker 270, approximately one-quarter mile below IPC's Oxbow Hydroelectric Plant. Oxbow Hatchery is a steelhead trout Oncorhynchus mykiss and spring chinook salmon O. tshawytscha adult holding and egg taking station.

OBJECTIVE

The primary purpose of Oxbow Hatchery is to trap enough returning adult steelhead and spring chinook to meet the Hells Canyon mitigation requirements for adult anadromous fish returns on the Upper Snake River. The mitigation goal is to produce 400,000 pounds of steelhead smolts at Niagara Springs Fish Hatchery. The Oxbow Fish Hatchery goal is to produce 1.3 million eyed steelhead trout eggs. Oxbow Fish Hatchery also traps spring chinook which are transferred to Rapid River Fish Hatchery for spawning.

Facility Description

Oxbow Hatchery consists of a main hatchery building, four adult holding ponds, an incubation water chilling unit, an off-station fish trap, and a single-family residence. The facility has six cinder block raceways that have exceeded their usefulness.

The hatchery building is a 28 ft x 60 ft, single-story metal structure partitioned into two main rooms. Half of the building consists of shop space, office space, and sleeping quarters, while the other half is for egg incubation. Two 8-ft square sheds attached to the main building provide storage.

The incubation room has the capacity to eye-up 3.4 million eggs. The 24 incubation stacks provide the hatchery with 384 incubation trays (FAL and Heath trays).

The chiller refrigeration unit is enclosed in a 12 ft x 17 ft metal building to the side of the hatchery building. The chiller has the capacity to chill 120 gallons per minute (gpm) of water to 40°F.

Adult holding and production facilities include four holding ponds, a fish trap, and a fish transport truck. The four holding ponds are actually two large ponds separated into four. The two larger divisions each measure 105 ft x 30 ft x 5 ft, providing 31,500 cubic feet of holding area. The two smaller divisions measure 55 ft x 30 ft x 5 ft, providing 16,500 cubic feet of holding space. Two

electric crowding racks provide the ability to consolidate the fish for handling. Six outside raceways (3 ft x 6 ft x 100 ft) could provide 10,800 cubic feet of rearing space after reparations. The adult fish trap consists of an attraction pool, the fish ladder, two weirs, a fish trap, and a loading hopper. The fish are removed from the trap when the loading hopper is hoisted the 80 feet to the fish transport truck. The fish truck is a 1981 GMC 2.5-ton, 10-wheeled truck with a bed-mounted 1,000-gallon fish tank. Up to 100 fish are then transported the 23 miles to Oxbow Hatchery.

Water Supply

The Snake River provides a major portion of the water for hatchery operations. A pumping platform adjacent to the hatchery holds two production pumps. These production pumps (100-hp each) produce 20 cubic feet per second (cfs). Only one pump operates at any given time. The other pump acts as an emergency backup and has a separate power source. Water temperatures range from a winter low of 38°F to a late summer high of 68°F (Figure 1). Water from the production pumps passes through two aeration pump platforms before entering the four holding ponds.

Two wells provide the water for steelhead trout egg incubation. One well acts as a primary water source, while the other is an emergency backup with a separate power source. The primary well water was a constant 52°F, while the backup was a constant 56°F. Both wells pump a maximum of 100 gallons per minute. Incubation water enters an elevated surge tank in the hatchery building before distribution through two 4-inch PVC water lines to the 24 incubator stacks.

Staffing

Oxbow Hatchery is staffed by one permanent Fish Hatchery Superintendent I. Two temporary Bio-aides and two laborer positions share the 2,400 hours budgeted for extra help.

Adult Collection

Fall trapping for steelhead trout started on November 4, 1992 and ended November 24, 1992 capturing a total of 1,259 steelhead. Due to high water flows through Hells Canyon Dam, the trap could not be operated during the spring of 1993 (Figure 2). The 1993 brood year steelhead run of 1,259 fish was comprised of 688 females and 571 males. The broodstock strategy of 1,200 fall-run fish and 400 spring-run fish was not met this year due to high water conditions during the spring.

All trapped steelhead trout were measured for fork length to the nearest centimeter. This procedure allowed for the age class designation of one-ocean steelhead being the male fish less than 68 cm and those female fish less than 65 cm. Using this criteria, 1,025 steelhead were one-ocean and 234 steelhead were two-ocean (Figure 3).

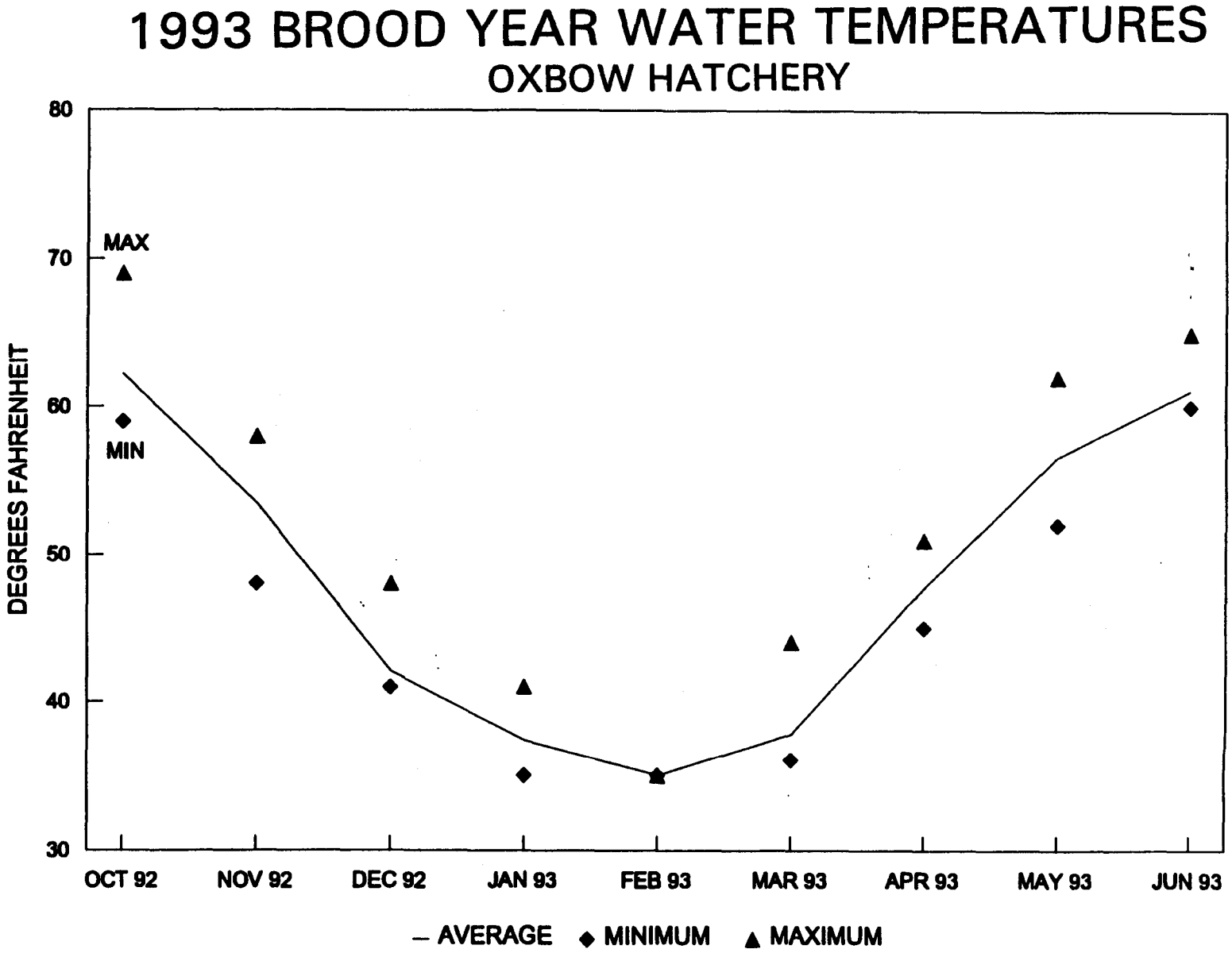

Figure 1. Brood year water temperatures at Oxbow Hatchery, 1993. Measured at holding ponds; range 35°F to 69°F. Water source Snake River.

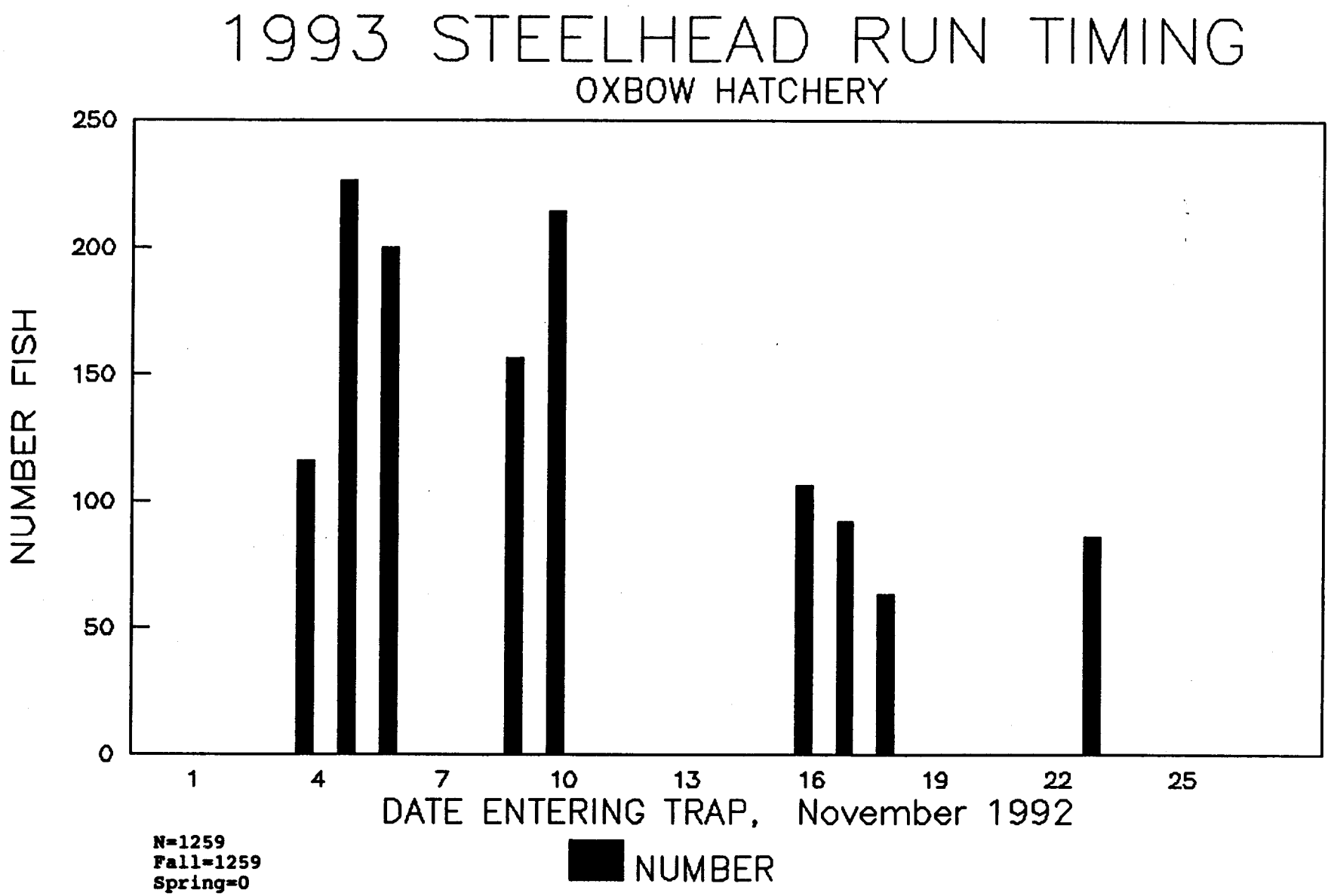

Figure 2. Steelhead run timing at Oxbow Hatchery, 1993. Trap operated November 4 through November 24.

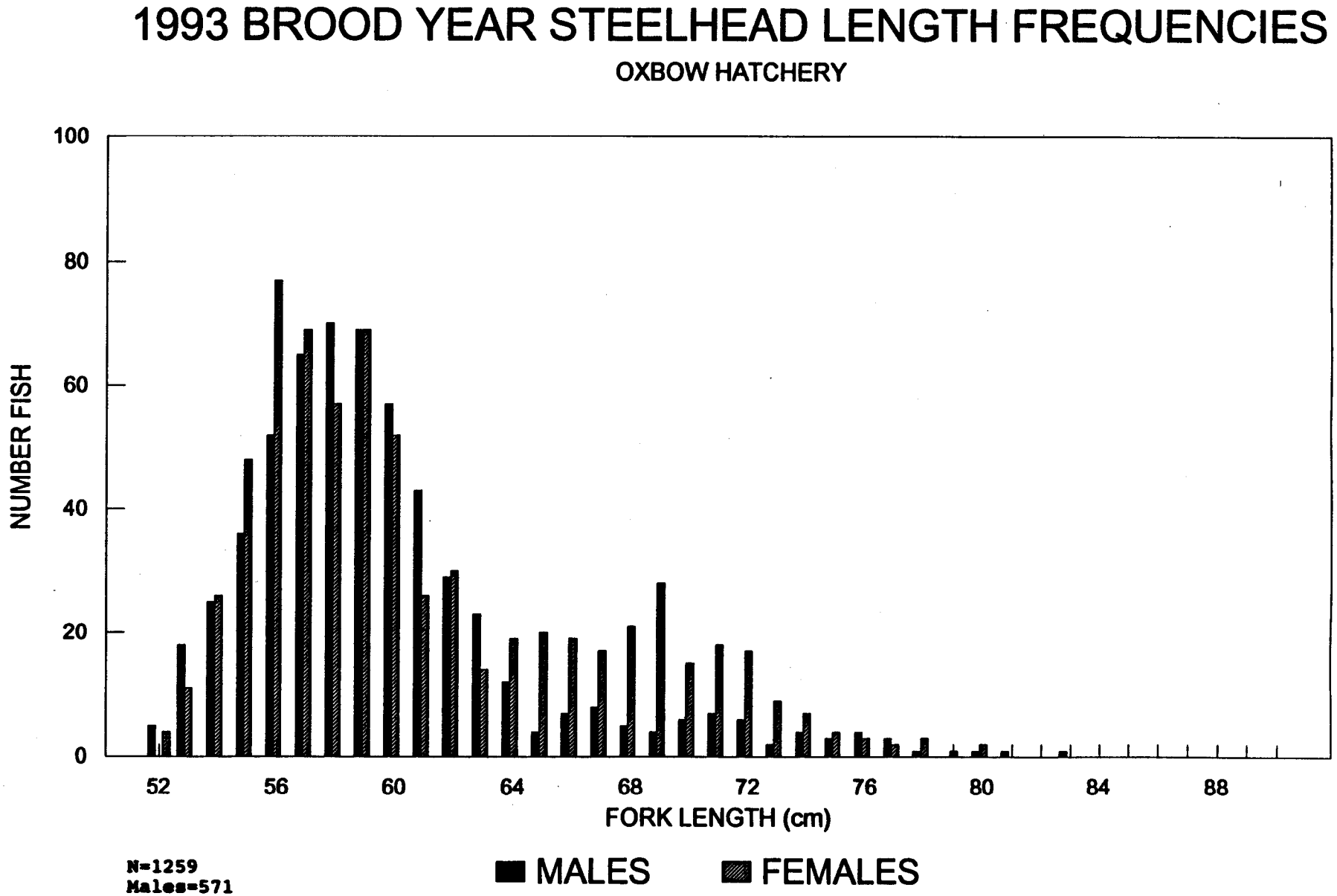

Figure 3. Brood year steelhead length frequencies at Oxbow Hatchery, 1993.

Adult fish releases amounted to 341 surplus adults consisting of 155 females and 186 males. One hundred twenty-nine were released into Hells Canyon Reservoir at Oxbow Hatchery. An additional 200 adults were released into the Payette River below Black Canyon Dam, and 12 adults released into the Morrison-Knudsen Nature Center pond.

Tag Recovery

This season, 56 steelhead trout were captured with some form of mark or tag. There were 31 fish with a left (or right) ventral fin clip, 23 fish with jaw tags, and 2 fish with floy tags. The tagging agencies included the National Marine Fisheries Service, the University of Idaho, the Washington Department of Fisheries, the Oregon Department of Fish and Wildlife, and the Idaho Department of Fish and Game. The snouts of the ventral fin-clipped fish were shipped along with all jaw and floy tags to the Lewiston Tag Recovery Laboratory.

Of the 1,259 steelhead captured, 8 were wild or natural fish (0.63%). Wild or natural steelhead were identified by having an adipose fin and the remaining fins not eroded.

Holding and Spawning

Adult Treatments

All fall-trapped steelhead trout that were not to be released were inoculated with Oxytetracycline 100 at 5 mg/kg of fish, or 1 ml to one-ocean fish and 2 ml to two-ocean fish (748 injected). The first inoculation was given upon arrival to the hatchery. The second inoculation was on December 7, 1992, the third was on January 11, 1993, and the final inoculation was on February 17, 1993.

Pre-spawning Mortality

Pre-spawning mortality consisted of all female steelhead that died prior to spawning and those male steelhead that died up to two weeks after the first spawning date (April 12, 1993). Prespawning mortality was 231 fish (18.3%) comprised of 118 males and 113 females. A majority of the mortality was attributed to overhandling during the innoculation process and the presence of fungus.

Spawning Operations

Steelhead trout spawning operations began on March 29, 1993 and ended on April 19, 1993. Females were sorted twice weekly for ripeness. Ripe females were killed with a blow to their head and bled by severing the caudal artery. Females were dry-spawned by incision, and the eggs were collected in a colander to drain the ovarian fluid. Eggs from two females were placed into a spawning

bucket, then fertilized with sperm from two males. The fertilized eggs were allowed to stand in two cups of well water for two minutes, then rinsed once with well water. Fertilized eggs were water-hardened in a minimum of 100 ppm buffered Argentyne for one hour. Ovarian fluid samples were collected from each spawned female for viral assay. The eggs were loaded into the incubator trays with two families per tray, maintaining the integrity of the disease samples.

Thirteen female steelhead trout were killed for spawning, but their eggs were culled due to abnormal appearance of eggs or internal organs.

Incubation

Seven egg takes produced 1,580,800 green eggs from 397 females for a fecundity of 3,981 eggs per female (Table 1). The percent eye-up was 87.0%, or 1,375,700 eyed eggs. Egg numbers were determined by enumeration of eyed eggs with a Jensorter brand Model JH egg sorter with electronic counter.

After the first two *days* of incubation, daily 15-minute drip treatments of 1,667 ppm formalin were used to prevent fungus. Incubator water flows were 5 gpm. Eggs eyed-up after 330 temperature units in the 52°F well water. Eyed eggs were shocked by pouring a tray of eggs into a bucket half full of water.

Egg Shipments

Approximately 20,000 unfertilized green eggs from 10 females and milt from 10 males were shipped to Clear Springs Hatchery. Niagara Springs Hatchery received 1,375,700 eyed eggs. The eggs were transported in 48-quart coolers with iced well water (Table 2).

Fish Health

In recent years, the focus of the Eagle Fish Health Laboratory (for Oxbow) has been to improve Oxbow's incubation water source. Very poor egg survival was attributed to the water used in egg incubation. This water (Snake River) has a very high silt content, an unacceptable Ph (8.5), high nitrates, and various other pollutants (including arsenic). Idaho Power Company has drilled two new wells for incubation, and significant increases in egg survivability have been attributed to this improvement.

Due to the length of holding of the steelhead, prespawning mortality can be a serious problem. Oxytetracycline injections have proven to be effective in limiting losses. Hells Canyon broodstock were possibly over-handled when prophylactic Oxytetracycline injections were applied during the winter.

Water analysis below Hells Canyon Dam revealed acutely lethal levels of copper (.29 ppm) in Deep Creek. Deep Creek flows directly into the Snake River right across from the fish trap that services Oxbow. Other heavy metals found in detectable concentration were lead, cadmium, and arsenic. Synergistic effects do exist in heavy metals, such that trace amounts of several elements can have an enhanced effect. Egg survivability has been correlated to adult exposure to heavy metals, even for brief periods. Furthermore, there is evidence that heavy metals affect the migratory ability of anadromous fish.

Table 1. Summary of steelhead spawning at Oxbow Hatchery, 1993.

Lot #	Spawn Date	Number Females	Green Eggs	Eyed Eggs	Percent Eye-up	Eggs/ Female
1	3/29	30	122,200	72,800	59.6	4073
2	4/01	54	212,400	180,400	84.9	3933
3	4/05	89	367,000	321,300	87.5	4124
4	4/08	95	406,800	367,800	90.4	4282
5	4/12	78	307,400	282,600	91.9	3941
6	4/15	31	128,600	116,300	90.4	4148
7	4/19	20	36,400	34,500	94.8	3366
TOTAL		397	1,580,800	11,375,70	87.0	3982

Table 2. Final disposition of Oxbow steelhead eggs, 1992.

Total Green Eggs	Total Eyed Eggs	Shipped Eyed to Niagara Springs
1,580,800	1,375,700	1,375,700

* ~20,000 additional green eggs from 10 females and milt from 10 males were shipped unfertilized to Clear Springs Hatchery.

In the future, Oxbow needs to update its adult holding ponds, crowding apparatus, and spawning area. In particular, the crowding apparatus should be considered a safety concern. Since malachite green is no longer to be used as an antifungal agent, other chemicals, such as formalin and iodine, will be utilized for control of fungus at this facility. Oxytetracycline injections, to control prespawning mortality, if utilized, will continue to be administered utilizing an intra-peritoneal route. This route reduces handling time and stress, allowing the injection crews to work the fish safely (Table 3).

Table 3. Brood year 1993 broodstock disease samples results.

Case #	Stock	Date	Data
93-89	HC STA	03/29/93	Viro: 0/30
93-98	HC STA	04/01/93	Viro: 0/54
93-100	HC STA	04/05/93	Viro: 0/89
93-116	HC STA	04/08/93	Viro: 0/96
93-131	HC STA	04/12/93	Viro: 0/78
93-143	HC STA	04/15/93	Viro: 0/32, PC: 0/32
93-152	HC STA	04/19/92	Viro: 0/20

Key: HC STA = Hell's Canyon A-run Steelhead
PC = Ceratomyxa shasta

Carcass Disposition

All carcasses were checked for clips, tags, and signs of bacteria and other diseases by hatchery employees. Sixty carcasses were provided to the IDFG McCall subregional office for use as bait with a black bear study. The remaining fish carcasses were taken to the Halfway Landfill for burial.

Steelhead Smolt Releases

The 1993 brood year steelhead trout smolts were released in the spring of 1994. In all, 609,115 steelhead smolts (150,585 pounds) were released into the Snake River below Hells Canyon Dam. Marked fish in these releases amounted to 85,082 CWT and 402 PIT tags. Niagara Springs Hatchery reared 265,835 of these smolts, while Babbington Farms, a private contractor, reared 343,280 smolts.

1992 SPRING CHINOOK BROOD YEAR REPORT

Spring Chinook Trapping

Spring chinook salmon returning to the Hells Canyon trap in 1992 were from smolt releases in 1989, 1990, and 1991 (Table 4).

Table 4. Spring chinook salmon releases and returns, brood year 1991.

Release Year	Smolts Released	1991 Returns by Release Year	Previous Returns
1989	500,000	18	20
1990	551,200	894	40
1991	500,500	22	0
Totals	1,551,700	934	

Spring chinook salmon trapping began May 12, 1992 and ended June 25, 1992 (Figure 4). A total of 810 salmon were trapped in May and 124 salmon trapped in June for a total of 934 spring chinook salmon. The 1992 Hells Canyon salmon run was comprised of 22 one-ocean fish, 894 two-ocean fish, and 18 three-ocean fish. A fork length of <54 cm denoted one-ocean fish, 54-80 cm defined two-ocean fish, and >80 cm designated three-ocean fish (Figure 5).

HOLDING AND SPAWNING

Adult Treatments

No injections or treatments were given while these fish were at Oxbow Hatchery. A total of 912 spring chinook salmon trapped in 1992 were shipped to Rapid River Hatchery (892 adults, 20 jacks).

Pre-spawning Mortality

Pre-spawning mortality for 1992 spring chinook was 201 fish (21.5%). Sixteen salmon died in the holding ponds and six at the trap at Oxbow Fish Hatchery. An additional 179 salmon died after transfer to Rapid River Hatchery. The majority of the mortality was attributed to fungus.

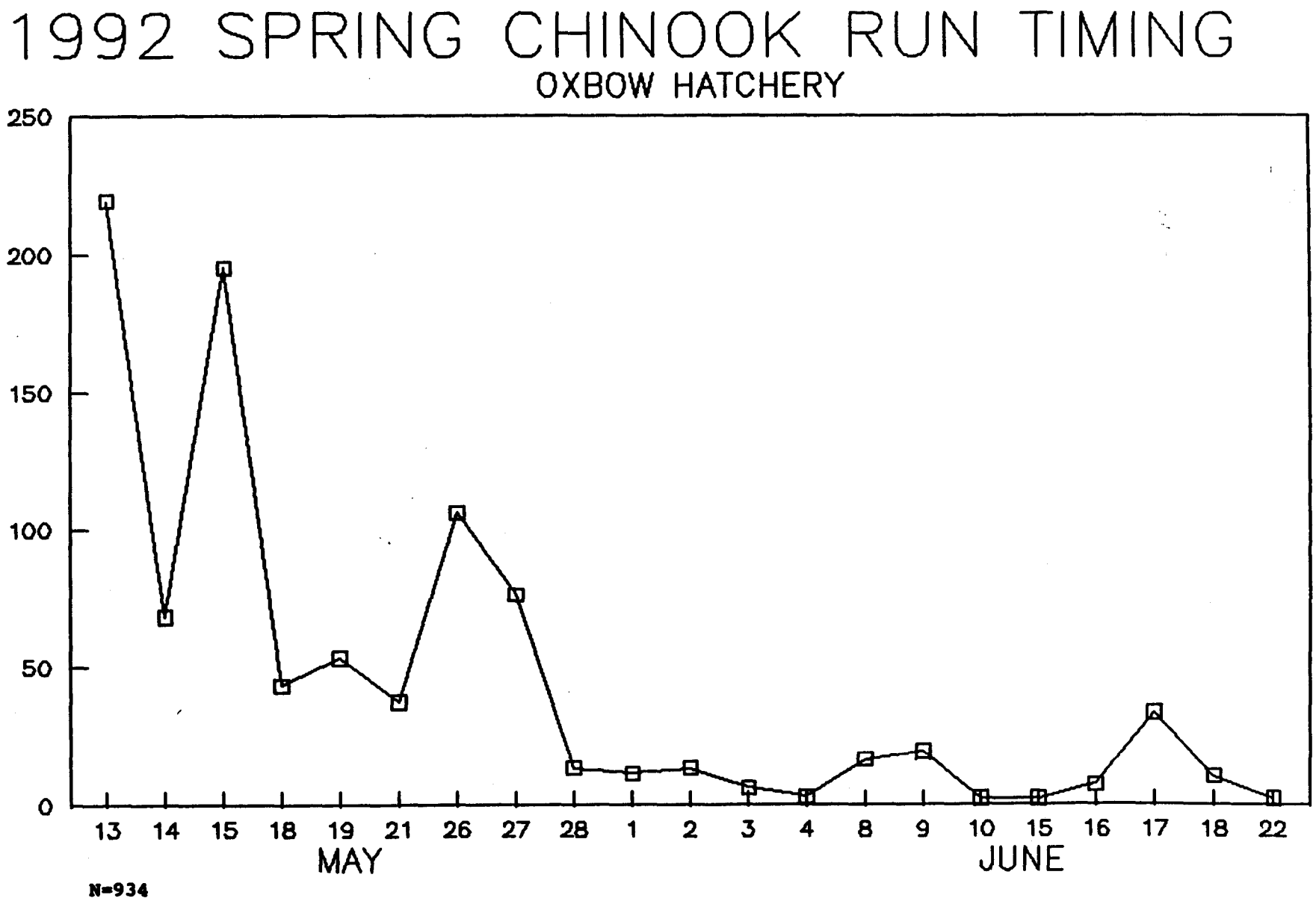

Figure 4. Spring chinook run timing at Oxbow Hatchery, 1992. Trap operation May 5 through June 25.

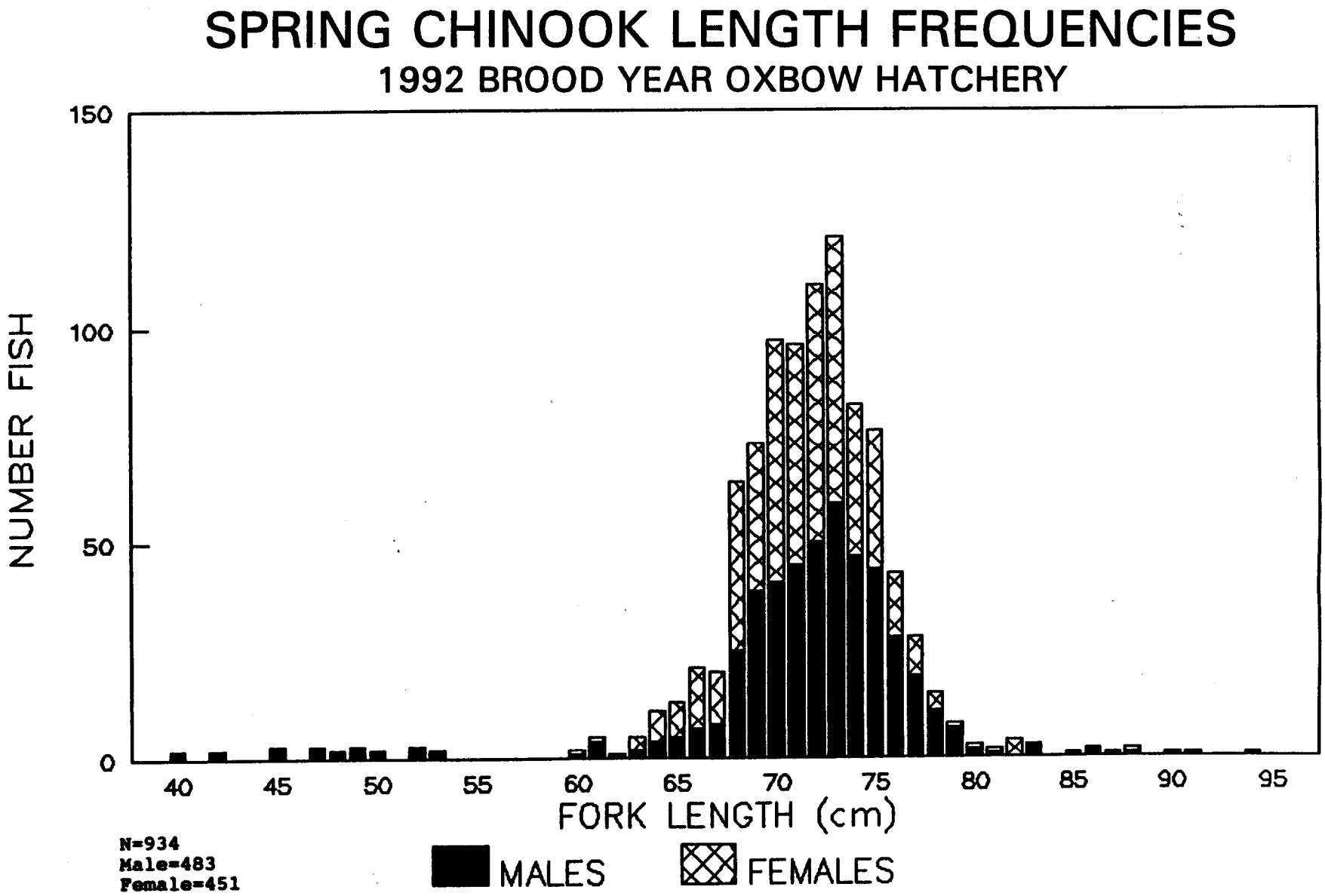

Figure 5. Spring chinook length frequencies at Oxbow Hatchery, brood year 1992. Trap operation May 12 through June 25.

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Spawning Operations

At Rapid River Hatchery, 337 female chinook salmon were spawned, producing 1,264,500 green eggs. The percent eye-up was 91.4%, leaving 1,122,100 eyed eggs to hatch.

Chinook Smolt Releases

Brood year 1992 spring chinook salmon releases were conducted in the spring of 1994. These smolts were reared at Rapid River Hatchery. A total of 380,504 smolts at an average of 26.8 fish per pound (14,198 pounds) were released into the Snake River below Hells Canyon Dam. All of these smolts were marked prior to their release. They were fin-clipped with an adipose fin removed. Of these fish, 250 received an additional PIT tag.

Incidental Capture of Fish

The fall trapping effort resulted in the capture of no fall chinook salmon.

HATCHERY IMPROVEMENTS

There were two new wells installed to provide fish egg incubation water. Each well has a separate power source so one functions as a backup to the other. A permanent structure was constructed to provide shelter for the spawning operation.

Idaho Power Company's Oxbow maintenance personnel were responsible for the work related to many hatchery improvements. The major improvements included:

* construction of a domestic well house
* installation of a booster pump for lawn irrigation
* fabrication of visitor information signs
* alteration of the fish trap to reduce fish injury
* installation of safety fencing and grating around various hazards

A major purchase for Oxbow Hatchery was a chilling unit for the incubation water system. Its installation will enable the hatchery to adjust the development rate of eggs. Slowing down the egg development will delay feeding and will help ensure the correct size at release without holding the fingerling off feed at final rearing facilities.

Another purchase consisted of 36 eight-tray FAL incubator stacks to replace some of the old stacks. Other purchases included a Compaq Deskpro 386 personal computer with an Okidata Microline 391 Plus printer and the requisite software, and a Snapper self-propelled mulching lawn mower.

HATCHERY RECOMMENDATIONS

The holding ponds need to be modified to create a better holding environment and to reduce fish stress and injuries during routine handling. Efforts should also be made to improve the water quality entering the holding ponds.

Another priority should be the renovation of the hatchery building. The incubation room needs water-proof paneling, adequate lighting, a heat source, and additional electrical outlets. Most of the incubators are new, but several of the old units need to be upgraded. The office space needs to be enlarged and arranged to provide a view of the fish holding ponds for fish monitoring and visitor safety. The dormitory needs major renovation, as it currently is inadequate for temporary employee housing.

The hatchery alarm system should be modified to directly sense the holding pond water level and to be able to register more than one alarm signal at any given time.

The Halfway Landfill ceased operation during the fall of 1993. After the closure, the closest landfill will be in Baker, Oregon. A portable freezer unit should be purchased or leased to hold fish carcasses until disposal. This would allow for 1 disposal trip rather than 12 to 16 trips.

APPENDICES

Appendix A. Temperature trends for Oxbow Hatchery from October 1992 through June 1993.

MONTH		MINIMUM TEMPERATURE	MAXIMUM TEMPERATURE	AVERAGE TEMPERATURE
OCTOBER	1992	59	69	62.2
NOVEMBER	1992	48	58	53.5
DECEMBER	1992	41	48	42.1
JANUARY	1993	35	41	37.4
FEBRUARY	1993	35	35	35.0
MARCH	1993	36	44	37.8
APRIL	1993	45	51	47.7
MAY	1993	52	62	56.6
JUNE	1993	60	65	61.1

Appendix B. Run timing of steelhead trapped at Hells Canyon, Fall 1992.

MONTH / DATE TRAPPED		NUMBER OF FISH
NOVEMBER	04	116
	05	226
	06	200
	09	156
	10	214
	16	106
	17	92
	18	63
	23	86
TOTAL		1259

Appendix C. Fork length (cm) frequency of steelhead, brood year 1993.

LENGTH	MALES	FEMALES
52	5	4
53	18	11
54	25	26
55	36	48
56	52	77
57	65	69
58	70	57
59	69	69
60	57	52
61	43	26
62	29	30
63	23	14
64	12	19
65	4	20
66	7	19
67	8	17
68	5	21
69	4	28
70	6	15
71	7	18
72	6	17
73	2	9
74	4	7
75	3	4
76	4	3
77	3	2
78	1	3
79		1
80	1	2
81	1	
82		
83	1	
TOTALS	571	688

AGE CLASS	MALE	FEMALE	TOTAL	AVG LEN
ONE*- OCEAN	523	502	1,025	58.3
TWO*- OCEAN	48	186	234	70.2
TOTAL	571	688	1,259	60.5

* Age Class Breakdown:
One Ocean (males <68 cm, females <65 cm) Two Ocean (males ≥68 cm, females ≥65 cm)

Appendix D. Fork length frequency of spring chinook, brood year 1992.

LENGTH (cm)	MALES	FEMALES	TOTAL
27*			
38* O			
42* N	2		2
45 E	3		3
46			
47 O	3		3
48 C	2		2
49 E	3		3
50* A	2		2
52 N	3		3
53*	2		2
60			2
61	4		5
62			
63	2	3	5
64	4	7	11
65	5	8	13
66	7	14	21
67 T	8	12	21
68 W	25	39	64
69 O	39	34	73
70	41	56	99
71 O	45	51	96
72 C	50	60	110
73 E	59	62	121
74 A	47	35	82
75 N	44	32	76
76	28	15	41
77	19	9	27
78	11	4	15
79	7		8
80	2		3
81 T	1	1	2
82 H		4	4
83 R	3		3
84 E			
85 E	1		1
86	2		2
87 O			
88 C			2
89 E			
90 A	1		1
91* N	1		1
94			1
TOTAL	483	451	934

AGE CLASS	TOTAL	**AVG LEN** (cm)
ONE* - OCEAN	22	46.82
TWO* - OCEAN	894	71.63
THREE* - OCEAN	18	85.22
TOTAL	934	71.30

* Age Class Breakdown: One Ocean (3-yr-olds, <54cm)
Two Ocean (4-yr-olds, 54-80 cm)
Three Ocean (5-yr-olds, >80 cm)

Appendix E. Oxbow hatchery, fish trapping summary and breakdown. STEELHEAD Brood Year 93

Fish Trapped		Age Class Breakdown *	
Males	57	1 Ocean	1,025
Females	68	2 Ocean	234
Total	1,259	Total	1,259

Fish Disposition	Males	Females	Total
Prespawn Mortality	118	113	231
Spawned	267	397	664
Released	186	155	341
Killed but not used	0	23	23
Total	571	688	1,259

Carcass Disposition	Males	Females	Total
Buried	571	628	1,199
Given to Biologists (bear study)		60	60
Total	571	688	1,259

* Age Class Breakdown: 1 Ocean (males <68 cm, females <65 cm)
2 Ocean (males >68 cm, females >65 cm)

SPRING CHINOOK SALMON Brood Year 92

Fish Trapped		Age Class Breakdown **	
Males	**481**	1 Ocean	22
Females	451	2 Ocean	**894**
Total	934	3 Ocean	18
		Total	**934**

Fish Disposition	Males	Females	Total
Preshipping Mortality	10	12	22
Shipped to Rapid River	471	439	912

All preshipping mortalities were buried

** Age Class Breakdown: 1 Ocean (3-yr-olds, <54 cm)
2 Ocean (4-yr-olds, 54-80 cm)
3 Ocean (5-yr-olds, >80 cm)

Appendix F. Snake River historic releases and return data.

Year	Chinook Released	Steelhead Spring	Released Fall	Chinook Returns	Steelhead Returns
1966			29,400		
1967		587,513			1,681
1968		342,114			1,609
1969		109,200	757,500	344	1,122
1970		385,900	670,960		136
1971			215,625		279
1972			630,900	3	650
1973				2	435
1974				1	125
1975			40,977	14	34
1976			85,510		224
1977		126,000	301,644		243
1978			344,944		186
1979			548,987	1	36
1980		348,520	191,900		339
1981	1,003,200	614,160			158
1982		354,150			203
1983	250,020	92,750	220,270	16	872
1984	500,850	458,917	630,500	3	1,116
1985	437,360	414,712	387,353	699	1,343
1986	140,000	819,495	39,995	395	2,438
1987	547,700	800,000	672,235	543	3,209
1988	400,600	877,400	75,814	458	2,524
1989	500,000	735,500	603,000	84	2,729
1990	551,200	947,200	351,400	30	2,728
1991	500,500	912,000		22	1,151
1992	500,500	243,900		912	1,714
1993	200,300	660,500		431	1,259
1994	380,504	609,115		29	1,403

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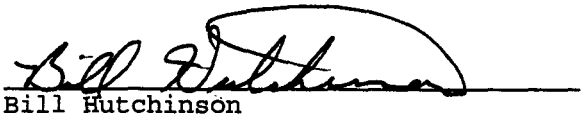
IDAHO DEPARTMENT OF FISH AND GAME

Steven M. Huffaker, Chief
Bureau of Fisheries



Bill Hutchinson
Hatcheries Manager